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ABSTRACT

This paper examines how teachers' expectations of their ability to produce student learning varies within teaching assignments. In the study described here, 359 teachers in 9 restructuring secondary schools in 1 district estimated their ability to perform common teaching tasks in 4 of the courses they expected to teach in the coming school year. Results show that teacher efficacy was lower for courses outside the teacher's subject. The findings indicate that teacher efficacy is threatened when teachers move away from their home departments, either by teaching a course outside their subject or by facilitating curriculum activities that cross departmental lines. The effects of teaching outside one's area were greater than the effects of track and grade, two course characteristics that have been linked to teacher efficacy in previous research. The study also found that teacher efficacy was influenced by teachers' leadership roles. Teachers who were expected to promote student learning across subjects had lower teacher efficacy than teachers in traditional positions of added responsibility (department heads) and teachers who were not in leadership positions. It is suggested that if reform is to succeed, reformers need to create coping structures and strategies for enabling teachers to move out of departments. (Contains 65 references and 6 tables.) (RJM)

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# The Effects of Course Assignment on Teacher Efficacy In Restructuring Secondary Schools[1]

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*Previous studies have treated teacher efficacy as a unitary trait without considering how teachers' expectations of their ability to produce student learning varies within teaching assignments. In this study, teachers in nine restructuring secondary schools in one district estimated their ability to perform common teaching tasks in four of the courses they expected to teach in the coming school year. Although the portion of the variance explained was small, the study found that teacher efficacy was lower for courses outside the teacher's subject. The effects of teaching outside one's area were greater than the effects of track and grade, two course characteristics that have been linked to teacher efficacy in previous research. This study also found that teacher efficacy was influenced by teacher leadership roles. Teachers who were expected to promote student learning across subjects had lower teacher efficacy than teachers in traditional positions of added responsibility (department heads) and teachers who were not in leadership positions.*

Evidence is developing that teacher efficacy, usually defined as teachers' expectations that they will be able to perform the actions that lead to student learning, is both a contributor to and consequence of school reform (Ross, 1995). But the empirical foundation for these claims rests on studies that treat teacher efficacy as a stable, unitary trait, despite evidence that within teachers it fluctuates over time (Ross, McKeiver, & Hogaboam-Gray, 1997) and varies with teacher tasks (e.g., Benz, Bradley, Alderman, & Flowers, 1992). The study reported here contributes to the small corpus of studies that focus on within-teacher variation in teacher efficacy, in this instance by focusing on the effects of course assignments. What makes the study unique is that it examined the impact of course assignments on teacher expectancies in schools that were making fundamental changes in their structures. The study is part of a longitudinal investigation of the outcomes of a site-based secondary school reform initiative that stimulated incremental adjustments in schools organized around subject-based departments. The goal of the reform was to create new structures and processes that cut across subjects.

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## Theoretical Framework

We begin by presenting research-based arguments to persuade secondary school reformers they should care about teacher efficacy. We then identify alternate definitions of teacher efficacy and measurement procedures. Our purpose is to focus on an unresolved problem, that teacher efficacy is a situation specific construct that has been treated as an omnibus trait in past research. We review previous studies examining within-teacher variation in teacher efficacy to set the stage for our research goal, to investigate the effects of course assignment on teacher efficacy in restructuring high schools.

### Why Teacher Efficacy Matters to Secondary School Reformers

Teacher efficacy is an expectancy about future outcomes that influences present behavior. In our conception it is a form of self-efficacy that influences behavior through cognitive processes (especially goal setting), motivational processes (especially attributions for success and failure), affective processes (especially control of negative feelings), and selection processes (Bandura, 1993; 1997). Teachers with high levels of teacher efficacy anticipate they will be successful. They choose more challenging goals, are more likely to take responsibility for outcomes, and persist in the face of failure. Previous studies have found a consistent relationship between teacher efficacy and responsiveness to instructional reform. Teachers with higher teacher efficacy are more likely to try out new teaching ideas, particularly techniques that are difficult, involve risks, and require control to be shared with students (Dutton, 1990; Czerniak & Schriver-Waldon, 1991; Moore, 1990; Riggs & Enochs, 1990; Ross, 1992). Teacher efficacy matters to secondary school reformers because it predicts which teachers and sites are likely to support instructional reform. Instructional reform matters because all organizational restructuring is premised on the belief that changing organizations will improve teaching practice.

The effects of teacher efficacy on teachers' willingness to innovate are reflected in student achievement differences. Teachers with high expectations about their ability to teach produce higher student achievement in core academic subjects (Anderson, Green, & Lowen, 1988; Ashton & Webb, 1986; Cancro, 1992; Moore & Esselman, 1994; Ross, 1992; Ross & Cousins, 1993; Watson, 1991) and on affective goals like self-esteem (Borton, 1991), self-direction (Rose & Medway, 1981), motivation (Roeser, Arbreton, & Anderman, 1993) and attitudes to school (Miskel, McDonald, & Bloom, 1983). Teacher efficacy matters to reformers because it is associated with the ultimate measure of reform effectiveness, student achievement.

Teacher efficacy is associated with elements characterizing recultured secondary schools such as collaborative cultures (Louis, 1991; Miskel et al., 1983; Rosenholtz, 1989; Ross, 1992), flattened administrative hierarchies in which principals share control of school decision making with teachers (Hipp, 1996; Lee, Dedrick, & Smith, 1991), and a shared school vision based on commitment to student learning (Hoover-Dempsey, Bassler, & Brissie, 1987). But teacher efficacy declines when reform initiatives challenge teachers' professional values and reduce their control of classroom decision making (Ebmeier & Hart, 1992; Rosenholtz, 1987; Ross et al., 1997).

## Definitions of Teacher Efficacy

There is substantial variation in how teacher efficacy construct is defined and measured. Teacher efficacy is a self-perception, not an objective measure of teaching effectiveness. It represents teachers' expectation that their efforts will bring about student learning. Most researchers distinguish two types of teacher efficacy, personal and general teaching efficacy, following Ashton and Webb's (1986) application of Bandura's social cognitive theory. The two types are empirically distinct, with items loading on separate factors (Gibson & Dembo, 1984; Guskey & Passaro, 1994; Woolfolk & Hoy, 1990) and correlating weakly or not at all (e.g., Ross, 1992).

The first type is personal teaching efficacy, which corresponds to Bandura's construct of self-efficacy: "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997:2). Individuals who feel that they will be successful on a given task are more likely to be so because they adopt challenging goals, try harder to achieve them, persist despite setbacks, and develop coping mechanisms for managing their emotional states. Individuals who believe they will fail avoid expending effort because failure after trying hard threatens self-esteem. Self-efficacy is situationally specific; it is not a generalized expectancy. It develops from a subject's appraisal of past experience with the task or with activities similar to it, although perceptions of efficacy can be modified by other sources of information such as observing the performances of others (Bandura, 1997).

The second type is general teaching efficacy: the belief that teachers are able to bring about student learning despite out-of-school constraints. It is similar to Bandura's outcome expectancy--the anticipation that certain actions will lead to particular outcomes. Outcome expectancy influences performance because people will not engage in an activity unless they believe it will have desirable effects (Bandura, 1997). General teaching efficacy differs from outcome expectancy in that general teaching efficacy is not personalized. It refers to the outcomes likely to be achieved by teachers in general rather than the outcomes likely to result from one's own actions. The teacher may not believe that he or she is able to perform the actions thought to be productive.

Other researchers (e.g., Guskey, 1982) define teacher efficacy as willingness to take responsibility for student successes and failures, following locus of control theory. Guskey and Passaro (1994) found that teacher responses to items measuring personal and general teaching efficacy really distinguished personal control factors that influence learning in the classroom from external control factors that lie outside the classroom. However, when operationalized as separate measures, locus of control is only moderately positively correlated with teacher efficacy (Hall, Hines, Bacon & Koulianos, 1992).

## Measurement of Teacher Efficacy

Differences in definition are reflected in differences in measurement. The earliest attempts were based on Rotter's (1966) control theory. Armor et al. (1976) developed single Likert items for personal and general teaching efficacy known as the Rand items. Although Rose and Medway

(1981) generated an expanded set to replace these single items, it is the Rand instruments that continue to be used (e.g., Ross, Cousins, & Gadalla, 1996). Gibson and Dembo (1984) created a larger set of items similar to the Rand measures, using exploratory factor analysis to select a nine item personal and a seven item general teaching efficacy scale. The Gibson and Dembo instruments have good psychometric properties and the assignments of items to scales have been confirmed with subsequent samples. The Gibson and Dembo items are the closest thing to a standard measure; including variants they are used in about half the teacher efficacy studies reported (Ross, 1998). Yet, there are concerns with these instruments: they overlap with locus of control, confuse efficacy with outcome expectancy, are susceptible to response bias (particularly in the general teaching efficacy scale which contains only a single negatively worded item), and most importantly, are too general to meet Bandura's definition of self-efficacy as a situation specific construct.

Bandura (1997) argued that self-efficacy is not an omnibus trait but a differentiated set of self-beliefs linked to distinct realms of human functioning. For this reason he rejected most teacher efficacy scales because they "are, in the most part, still cast in a general form rather than being tailored to domains of instructional functioning" (1997:243). Some researchers responded to Bandura's critique by adapting the Gibson and Dembo items to specific subjects, creating 15-25 items for each of science (Riggs & Enochs, 1990), chemistry (Rubeck & Enochs, 1991), mathematics (Huinker & Madison, 1995) and economics (Enochs, Schug, & Cross, 1996). But Bandura argued that self-efficacy scale construction should be guided by a conceptual analysis linking competencies to outcomes within a specific domain. He recommended "casting efficacy items at an intermediate level of generality" (1997:50) as a bridge between an atomized list of abilities and global descriptions.

Meeting Bandura's critique is problematic in teacher efficacy research because there is no consensus about which teacher competencies predict student outcomes. Rather there is a central tendency among exemplars of good teaching (Sternberg & Horvath, 1995) that embodies expertise in disciplinary content and knowledge of how to teach that content (Kennedy, 1998). These competencies which are unique to particular courses combine with general pedagogical knowledge (e.g., student management techniques) that cuts across courses. No instruments are currently available that meet this standard.

Within-Teacher Variation in Teacher Efficacy

Very few studies have examined situation specific variations in teacher efficacy within teachers. Two studies identified course assignment as a significant predictor of efficacy beliefs. Raudenbush, Rowan, and Cheong (1992) found that teachers had higher expectations about their ability to help secondary school students learn when teaching courses for which the teacher felt well prepared and that contained students who were older, engaged in academic tasks, and on a higher academic track. They also found effects for between-teacher factors, including subject specialization (the effects of tracking on teacher efficacy were particularly strong for mathematics and science teachers). Ross et al. (1996) generated additional evidence that secondary teacher expectations of their effectiveness are influenced by the courses they are assigned to teach. Teachers expressed higher teacher efficacy in courses in which they believed students were highly

engaged in classroom activities. The relationship was stronger for mathematics and science teachers. The findings from these two studies are consistent. For secondary school teachers, teacher efficacy is not homogenous but varies with the courses to which teachers are assigned (a within-teacher factor) and the relationship between teacher efficacy and course assignments is influenced by teacher specialization area (a between-teacher factor).

These studies share similar deficiencies. First, the reliability of the dependent measure could not be determined because teacher efficacy was measured with a single indicator. In Raudenbush et al. (1992) it was feelings of success, a reasonable proxy for teacher efficacy because perceptions of success are the greatest source of self-efficacy information (Bandura, 1993). In Ross et al. (1996) it was measured with an adaptation of the Rand measure "if I try really hard I can get through to even the most difficult or unmotivated students in this class" (Armor et al., 1976). But single item self-efficacy measures correlate poorly with multiple item instruments and are weak predictors of performance (Lee & Bobko, 1994).

Second, both studies asked teachers to respond in terms of the courses they were presently teaching. Since teacher efficacy is an expectancy, a better strategy would be to ask about their expectations for a course they are about to teach.

Third, both studies treated specialization area as a between-teacher variable without considering that it might also be a within-teacher factor influencing teachers' expectations about their ability to promote learning within particular courses. In social cognitive theory, self-efficacy beliefs transfer from one domain to another only in limited conditions, for example, when the skills for the two domains were developed together (Bandura, 1997), which might be the case for general pedagogical strategies like student management but not for strategies for explaining different content. Experienced teachers behave differently when they are teaching outside the content area familiar to them (Hashweh, 1987; Ringstaff & Haymore, 1987; Sanders, Borko, & Lockard, 1993). Lack of subject content teaching knowledge leads to over-reliance on procedural rules (Eisenhart et al., 1993), lack of connectedness between topics (Stein, Baxter, & Leinhardt, 1990), use of low risk strategies that reduce opportunities for students to change the lesson agenda (Carlsen, 1993; Lee, 1995) and failure to anticipate student misconceptions (Clermont, Borko, & Krajcik, 1994). The behavioral consequences of teaching outside one's area of specialization (diminished teaching effectiveness) might be paralleled by reductions in teachers' expectancies about their ability to teach. Although no study has investigated this issue, we predicted that teachers would have lower teacher efficacy when asked to teach a course outside their area. If this were to be the case, it would have implications for secondary school reform efforts that promote curriculum integration, for example, by creating house systems and interdisciplinary courses.

Research Questions

Our study asked two questions: First, what effects do course assignments have on teacher efficacy? Our main focus was the effect of teaching outside one's area of specialization. We anticipated that teachers would have higher expectations of their abilities in courses within their teaching area, defined as the match between particular courses and the dominant subject in the

teacher's load. We also examined other within-teacher predictors identified in previous research as contributors to teacher efficacy: course track and grade.

Second, is teacher efficacy influenced by between-teacher factors? Of particular interest was the impact of subject area on teacher efficacy. We anticipated that teacher efficacy would be higher in high status departments such as Mathematics, Science and English, than in lower status departments such as Business, Social Studies, and Student Services. Siskin (1994) described the former set as privileged subjects because they are compulsory, they can screen students into multiple tracks, they have broad societal support and they are usually more successful in accessing school resources. In addition we speculated that teacher efficacy might be related to type of teacher leadership position, an issue not addressed in previous research. In our district there were two kinds of teacher leaders: long-tenured heads of subject departments and teachers who had just been appointed to cross-departmental positions of responsibility. We anticipated that the new leaders would have higher teacher efficacy because their aspirations were reflected in the restructuring occurring in their schools. They were part of the solution created by departmental Balkanization (Hargreaves, 1994). We predicted subject department heads would have lower teacher efficacy because they perceived their positions to be under siege in the development of school plans.

We also examined the effects of other between-teacher variables that have been associated with teacher efficacy in previous studies such as gender, career and school experience. Females tend to have higher teacher efficacy (Anderson et al., 1988; Huberman, 1992; Kalaian & Freeman, 1994; Lee, Buck, & Midgley, 1992; Louis, Marks, & Kruse, 1994; Raudenbush et al., 1992), although gender effects do not appear in all studies (e.g., Riehl & Sipple, 1995; Ross et al., 1996). Teacher efficacy tends to rise with career teaching experience (Dembo & Gibson, 1985; Hoy & Woolfolk, 1993; Rubeck & Enochs, 1991), but the correlations are weak and based exclusively on cross-sectional data. We anticipated that teacher efficacy would be higher among women than men and among teachers with greater years of career experience. We also investigated the influence of experience in the school on teacher efficacy.

## Method

Sample Teachers (N=359) in nine secondary schools in a single district in central Ontario, Canada completed a survey in June prior to the implementation of new school organizations in September. District administrators, after negotiations with union officials and elected trustees, had given each secondary school the mandate and resources to redesign its positions of added responsibility. Schools were encouraged to de-emphasize traditional subject headships and create new positions that cut across existing departments (e.g., student assessment facilitator). Administrative stipends and release time previously attached to traditional headships could be used to create resource pools to address school priorities, particularly those that promoted cross-disciplinary renewal (Hannay & Ross, 1997).

Instrument Teachers completed a self-administered questionnaire. Within-teacher variables consisted of the criterion variable (teacher efficacy) and three predictors (course track, course grade, and match with the teacher's area of teaching specialization). The between-teacher

variables consisted of gender, career experience, school experience, school leadership role, and teacher's subject.

*Teacher Efficacy* (criterion variable). We constructed an instrument unique to this study because teacher efficacy measures used in past research did not meet the criterion of situational specificity described above. We focused on courses within high schools rather than subjects because courses are the key work assignments for secondary teachers; courses represent the intersection of content and learner characteristics; the content of courses (unlike subjects) is defined by government curriculum guidelines; and courses predicted within-teacher variation in teacher efficacy in previous studies (Raudenbush et al., 1992; Ross et al., 1996). Teachers identified four courses they would be teaching in the fall.

For each course teachers responded to five prompts beginning with the stem "I feel confident in my ability to…", using a six-point scale anchored by strongly agree/disagree. The prompts described five instructional functions essential to every course: (i) identify the most important learning outcomes for the course; (ii) sequence course content; (iii) explain key concepts; (iv) anticipate which areas of the course are most likely to cause students difficulty; and (v) evaluate student progress. The prompts, especially (iii) and (iv), emphasize teaching for conceptual understanding rather than for recitational knowledge (Kennedy, 1998) because teaching for understanding was the district's instructional goal for school reform. The items emphasized teachers' knowledge of how to deliver course content (pedagogical content knowledge) rather than knowledge of the content itself (disciplinary knowledge) or teaching principles like student management strategies (general pedagogical knowledge) unlikely to vary between courses. The mean teacher efficacy score on these five prompts was calculated for each of the four courses and was normalized using log transformations.

*Within-Teacher Predictors*

*Match with teacher's area of teaching specialization.* Courses were assigned to one of eight subjects using the course descriptions in school calendars: Mathematics, Science, Business and Technology, English, Arts, Social Studies, Other Languages and Student Services. Teachers were assigned to one of the eight subjects.[2] Third, each course was coded 1 if it matched the teacher's subject or 0 if it did not. Two researchers independently assigned courses to subjects, assigned teachers to subjects, and coded each course as a match or non-match with the teacher's subject. Since the course codes used by the schools were in almost all cases the labels provided in provincial curriculum documents, there were only a few differences in assignments and these were quickly resolved through discussion.

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[2] If two, three or four of the teacher's four courses were in the same subject, the teacher was assigned to that subject. If the teacher had two courses in one subject and two courses in another (N=14), the teacher was assigned to the subject of the first course named. If none of the courses were in the same subject, the teacher was not assigned to any subject and was deleted from the study (N=23).

*Track*: basic (special needs students)=1, general (community college or employment bound)=2, destreamed (a mixture of all ability levels)=3, and advanced (university bound)= 4. Course *grade*: 9-12 and OAC (Ontario Academic Credit: university preparation) coded 1-5. Grade and track were partly confounded: All grade 9 courses were destreamed and all OAC courses were advanced. In previous research teacher efficacy was higher in advanced level courses and in higher grades (Raudenbush et al., 1992).

*Between-Teacher Predictors*

*Teacher's subject* was defined as one of the eight subject categories described above. These were dummy variables (1=yes, 0=no). *Leadership role in the school*: subject head/assistant head (leadership positions in the old structure), facilitator (new cross-departmental leadership positions), full-time teacher (no added responsibility) or part-time teacher (no added responsibility). Each category was treated as a dummy variable (1=yes, 0=no). *Gender* (1=female, 2=male) was determined from the demographic section of the survey. *Career teaching experience* and *(current) school teaching experience* were continuous variables; teachers wrote in the number of years for each.

Data Analysis Our original intention was to use three-level Hierarchical Linear Modeling (Bryk, Raudenbush, & Congdon, 1996). By invoking HLM we planned to simultaneously estimate within-teacher, between-teacher, and school effects on teacher efficacy. This analysis was only partly successful. We were able to determine the effects of grade and track and the impact of between-teacher variables but, for reasons described below, HLM did not enable us to examine the key issue of the effect of teaching outside one's subject on teacher efficacy.

We used step-wise multiple regression to complement the HLM analysis. We began by focusing on the within-teacher variables. Teacher efficacy was the dependent variable and match with teacher's subject, track, and grade were independent variables. We ran a series of four between-teacher analyses, one for each of the courses identified by teachers. The best single predictor was selected first and other variables were entered only after the effects of the previous variables were estimated.

For the between-teacher analysis, the within-teacher variables were aggregated to the teacher level by calculating mean scores across courses. A series of step-wise multiple regression analyses were conducted with teacher efficacy as the criterion. The predictors were the aggregated within-teacher variables and between-teacher variables, either as single predictors or as sets of dummy variables. In the first run the within-teacher variables were entered with gender, career teaching experience, and teaching experience in the school. In the second run, the within-teacher variables were entered with a block of dummy variables representing teacher's subject. In the third run, the within-teacher variables were entered with a block of dummy variables representing teachers' leadership role. Limitations of sample size precluded the strategy of running all of the predictors simultaneously.

## Results

Descriptive statistics are displayed in Table 1 for the within-teacher variables. Table 1 shows that the internal reliability of the teacher efficacy scale was adequate in all four courses. The mean teacher efficacy scores were very high, diminishing only slightly across the four courses. The match with the teacher's subject was also high (1.0 would be a perfect match). The degree of match decreased across the four courses while the variation increased. Teachers appeared to record first the courses that were closest to their interests. The Ns diminished across the four courses because a number of teachers taught less than four unique courses. The distribution of course track and grade characteristics varied. Teachers were more likely to identify grade 9/destreamed courses first.

**Table 1 About Here**

Table 2 provides descriptive statistics for the between-teacher variables (after removing teachers who had no clear area of specialization). Teachers were relatively evenly distributed across six of the subjects with only a few teachers in Other Languages (mostly French) and Student Services (virtually all were courses for special needs students). The average teacher was in mid-career and had spent 70% of it in the current school.

**Table 2 About Here**

When we began the HLM analysis we found that almost the entire teacher sample was excluded. The problem was that HLM excludes subjects if they fail to vary on any of the variables used in the analysis. As shown in Table 1, most of the teachers in this study taught courses that matched their subject area and were therefore excluded. We were able to run HLM using only grade and track as predictors of teacher efficacy. The HLM within-teacher analysis (shown in Table 3) indicated that 44% of the variance in teacher efficacy was due to within-teacher factors: .441/.441 + .556. The predictors accounted for 5% of the within-teacher variance (1- .417/.441). Only track was statistically significant. Teachers had greater confidence when teaching lower ability students.

**Table 3 About Here**

The full between-teacher analysis was not carried out because the key within-teacher variables had been excluded. The exploratory analysis done by HLM flagged between-teacher variables as possible predictors for the intercept (constant), grade and track. The first row of Table 4 (Constant) shows that the strongest predictor was being in a facilitator role. Teachers appointed to new leadership positions had lower teacher efficacy than teachers appointed to traditional departmental leadership roles and teachers who had not been appointed to positions of added responsibility. The second row of the table indicates that the influence of grade on teacher efficacy was stronger for facilitators than it was for other teachers. The last row of Table 4 shows that the expectations of facilitators about their effectiveness were less influenced by track than was the case with other teachers.

**Table 4 About Here**

Table 5 displays the results of the step-wise regression of teacher efficacy with the within-teacher variables (match with teacher's subject, grade and track). The results were consistent for three of the four courses. The only variable that significantly predicted teacher efficacy was match with teacher's subject. Teachers were more confident about their ability to perform typical teaching tasks for courses in their subject. The exception was Course 3. In this instance the only significant predictor was grade. Teachers were more confident teaching senior classes. The proportion of the variance explained was very small.

**Table 5 About Here**

Table 6 shows the results of the step-wise regression of teacher efficacy on the pooled within- and between-teacher variables. In the first run the only significant predictor was match with teacher's subject. Neither grade nor track had a significant impact when match with teacher's subject was in the equation. Neither were gender or teaching experience significant predictors. The analysis was repeated using the same pooled within-teacher variables and teacher's subject area (entered as a block). Again, the only significant predictor was match with teacher's subject. In the final run, the pooled within-teacher variables were entered with leadership role as a block of dummy variables. In this run, being in the new facilitator role emerged as a significant between-teacher predictor. This variable and the within-teacher variable, match with teacher's subject area, were the only significant predictors. Teachers who were appointed to cross-disciplinary roles had lower teacher efficacy than teachers in traditional headships or in non-leadership positions. The proportion of the variance explained was very low.

**Table 6 About Here**

## Discussion

With regard to the first research question we found that course assignments had an effect on teacher efficacy. The HLM analysis found that track was the only predictor of within-teacher variance but the finding was not in the expected direction. Track was negatively related to teacher efficacy. But other studies found that teachers felt more capable teaching higher track students. (Ashton, Webb & Doda, 1983; Lee et al., 1991; Raudenbush et al., 1992; Riehl & Sipple, 1996; Smylie, 1988). The reason for the discrepancy is that our study was conducted in restructuring high schools. One aspect of the restructuring was an earlier provincial decision to destream (detrack) first year courses. Destreaming was opposed by teachers who believed its adoption disregarded their professional judgment (Langford, 1996) and a qualitative study found that destreaming depressed the efficacy beliefs of teachers (Ross et al., 1997). We operationalized track as increasing average mean ability, as other researchers have done. But we had four levels rather than the usual two or three: (1) basic (2) general (3) destreamed and (4) advanced. The mean student ability of destreamed courses was higher than general and basic courses, which should have made them easier to teach. Yet, in Ross et al. (1997) we found that teachers believed destreamed classes were more difficult because strategies developed for teaching general and basic students in segregated tracks could not be easily applied in mixed ability courses (without

reducing the challenge for high ability students). The finding that track negatively influenced teacher efficacy suggests that the relationships between teacher efficacy and other variables in traditionally organized secondary schools may not generalize to restructuring high schools.

We found that track was not a statistically significant predictor when match with teacher's subject was in the equation. Match with subject had a greater impact than track in three of the four course analyses. Raudenbush et al. (1992) found that the influence of track on efficacy beliefs diminished when engagement was introduced. These variables might be related in that each is concerned with the teacher's ability to enlist student attention in learning course content. For example, it might be more difficult to think of appropriate connections between the learner's experience and academic content when teaching outside one's area.

We also found that when match with subject was aggregated to the teacher level it continued to be a significant predictor of teacher efficacy when other between-teacher variables were introduced. The finding that secondary teachers have higher expectations about their ability to teach courses within their subject extends the findings about the behavioral effects of teaching outside one's area of expertise. Previous research has found that the relationship between expectancy and teaching practice is reciprocal (Ross, 1998). Teachers with higher teacher efficacy are more willing to implement teaching strategies that stretch their abilities. High teacher efficacy enables these teachers to persist through obstacles, increasing the likelihood of success. Classroom success contributes to higher teacher efficacy in an upward spiral. The finding that teaching outside one's subject has a negative effect on teacher efficacy suggests that a downward spiral could ensue from such assignments. Lower teacher efficacy might lead teachers to select less challenging instructional strategies when assigned a course outside their expertise (as evidenced by Carlsen, 1993; Lee, 1995; Stein et al., 1990). The use of less powerful methods might depress achievement (which is a potential effect of teaching outside one's subject that has not been investigated). Poor classroom outcomes might depress teacher efficacy further.

The finding that teaching outside one's area has a negative effect on teacher efficacy is limited in several ways. First, our study involved only secondary school teachers. For elementary teachers who are used to teaching all subjects the effects may be less severe. However, Lee (1995) and Stein et al. (1990) reported case studies in which elementary teachers' lack of disciplinary knowledge impeded their teaching. Teaching outside one's area of expertise may be less of a problem for elementary than for secondary teachers but the issue is hardly moot.

The second limitation on the generalizability of our finding is the difficulty in operationalizing the construct, teaching outside one's subject. Some researchers (e.g., Enochs & Riggs, 1990) measure subject-based expertise in terms of certification and number of undergraduate courses taken. But expertise in teaching a subject is only partly related to disciplinary knowledge. More important is pedagogical content knowledge—understanding how to present content, predicting areas of student confusion and remediating misconceptions—as demonstrated in qualitative studies in which the knowledge base of small teacher samples is used to interpret their teaching practices (e.g., Eisenhart et al., 1993). In addition teachers change subjects over their careers. Some science teachers become math specialists (e.g., "William" in Ross et al., 1997), although the frequency of such changes is unknown. In our study we defined

teacher's subject area as the subject of that teacher's highest proportion of courses. This procedure ignores the possibility that a science teacher might be involuntarily assigned math classes at the time our study was conducted due to changes in faculty complement or trends in student course selection. It also ignores the possibility that teachers might define their expertise within subjects. A science teacher with training and interest in biology will find that the grade 9 science course includes topics from biology, physics, and chemistry. Even within subspecialties teachers may feel more capable teaching grade 11 chemistry than OAC chemistry. There may also be variance in teacher efficacy within courses (e.g , greater confidence in teaching force and energy than optics).

The third limitation of our finding is there may have been ceiling effects affecting teacher efficacy and match with teacher's subject. Teacher efficacy may have been inflated by asking teachers in June to respond to courses they would be teaching in the fall. Bandura (1997) found that self-efficacy declines as the time of performance draws near and the task looks more formidable. The small proportion of the variance explained may reflect the constrained variance in the dependent and key independent variables. Although we found that match with teacher's subject had the same impact on teacher efficacy in the fourth course (72% match with subject) as in the first course (90% match), it is possible that a wider range (e.g., if teachers were asked to rate the extent to which courses were within the teacher's area of expertise) would have moderated the findings. Our failure to explain a larger portion of the variance may indicate that our measure of teacher efficacy has lower construct validity than measures used in other studies. Or it might mean that the predictors of self-efficacy in restructuring high schools are not the same as those in traditionally organized secondary schools.

Finally, we did not examine how school factors might affect the relationship between subject match on teacher efficacy. For example, a school might have an underclass of teachers who are continually assigned "left over" courses while an adjacent school might equalize opportunities for teachers to obtain their course preferences. In addition the effects of teaching outside one's subject might be reduced in collaborative schools in which teachers share instructional materials, offer advice, and provide other forms of support. With only nine schools in the sample, there was insufficient statistical power to address school factors.

In summary our findings with regard to the first research question our tentative. We found that teaching outside's one's area of specialization had a negative impact on efficacy beliefs but we accounted for such a small proportion of the variance that we can not claim that the hypothesis has been adequately tested.

With respect to our second research question we found that teacher efficacy was influenced by between-teacher factors. The HLM analysis found that after within-teacher variance was controlled, facilitators (those in new teacher leadership positions that cut across subjects) had lower teacher efficacy than heads and assistant heads of subject based departments and teachers who were not in positions of added responsibility. The regression analysis produced the same result. Although it is possible that the teachers appointed to facilitator roles might have had lower teacher efficacy prior to their appointments, it is unlikely. Competition for the facilitator positions was keen and school restructuring committees selected the teachers they believed to be most

capable, who would tend to have higher efficacy because it is positively correlated with global measures of teacher competence. For example, teachers with high teacher efficacy receive higher ratings from their supervisors (Hoover-Dempsey, Bassler, & Brissie, 1987), have lower absenteeism (Imants & Van Zoelen, 1995), and higher commitment to the profession (Coladarci, 1992). We interpret the key between-teacher finding to mean that teachers' expectations about their professional abilities were weaker because they knew they would be working outside their subjects. For example, in one school a student assessment facilitator who was teaching English could be asked to help science teachers design performance assessments. In another school the curriculum integration facilitator who was teaching physical education might be asked to help teachers of geography and computer studies design an integrated course.

The HLM analysis also found that facilitators' expectations of success were more heavily influenced by grade than was the case for teachers not in leadership positions or in department headships. Some schools created positions in which the facilitator was expected to increase curriculum integration within grade 9 only. This focus would increase the salience of grade for facilitators in such roles. The teacher efficacy of facilitators was less influenced by track. We have no explanation for this finding.

The proportion of the teacher efficacy variance explained in this study was low but as Abelson (1995) and others have observed, if an outcome variable is difficult to influence, and the outcome matters, even a small change is practically important. Teacher efficacy tends to be a relatively stable teacher characteristic. Ross (1994) found that test-retest correlations over an eight-month period ranged from .51 to .81. Interventions to strengthen teacher efficacy (reviewed in Ross, 1995) produced mixed results. As we argued at the outset teacher efficacy matters to secondary school reformers because it predicts teacher willingness and ability to innovate, student achievement, and elements characterizing recultured schools.

## Conclusion

There is a dual thrust in talk about subjects in secondary reform. Some reformers see subject departments as the root of all evil. Departmental cleavages impede the formation of school identity, create obstacles to communication, limit innovation, and reify existing images of teaching and learning. On the other hand many of the instructional improvement efforts in the secondary school focus on inducting students into disciplinary communities maintained by subject departments. Teaching for understanding means teaching students how to reason within subjects, using processes and knowledge structures defined by the discipline. Our results suggest that teacher efficacy is threatened when teachers move away from their home departments, either by teaching a course outside their subject or by facilitating curriculum activities that cross departmental lines. If reform is to succeed, reformers need to create coping structures and strategies for enabling teachers to move out of departments. As our longitudinal study of secondary school change in this district continues we will be recording what happens to teacher efficacy. One possibility is that the minor declines we observed in this study will deepen in a downward cycle of lowering teacher efficacy, deteriorating instructional practice and declining student achievement. Another possibility is that teachers who move away from their subjects will experience a resurgence of teacher efficacy as they learn new ways of operating in schools less

bound by subject departments. Qualitative data collected in the year following the survey data reported here suggest that the latter is occurring but differences between schools in response to opportunities for renewal one year are large (Hannay & Ross, 1997).

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**Table 1 Description of Within-teacher Variables**

| | Course 1 | Course 2 (n=311) | Course 3 (n=290) | Course 4 (n=209) |
|---|---|---|---|---|
| Teacher efficacy (5 items, 1-6) | (n=359) | (n=328) | (n=304) | (n=224) |
| Alpha | .86 | .87 | .91 | .92 |
| Mean | 5.49 | 5.44 | 5.30 | 5.25 |
| SD | .61 | .66 | .81 | .84 |
| Match with teacher's subject (0-1) | (n=347) | (n=323) | (n=298) | (n=221) |
| Mean | .90 | .86 | .79 | .72 |
| SD | .30 | .35 | .41 | .45 |
| Track (1-4) | Percent (n=329) | Percent (n=314) | Percent (n=292) | Percent (n=211) |
| Basic | 2.7 | 2.9 | 4.5 | 4.7 |
| General | 26.1 | 42.7 | 37.3 | 37.9 |
| Destreamed | 30.1 | 11.8 | 14.4 | 16.1 |
| Advanced | 41.1 | 42.7 | 43.8 | 41.2 |
| Grade (1-5) | Percent (n=330) | Percent (n=316) | Percent (n=291) | Percent (n=211) |
| 9 | 32.1 | 13.0 | 14.8 | 15.6 |
| 10 | 20.9 | 33.5 | 22.3 | 22.7 |
| 11 | 18.8 | 31.0 | 29.6 | 30.8 |
| 12 | 13.3 | 17.1 | 24.7 | 18.0 |
| OAC | 14.8 | 5.4 | 8.6 | 12.8 |

**Table 2 Description of Between-teacher Variables** (n=315)

| | Percentage | |
|---|---|---|
| Subject | | |
| Mathematics | 14.8 | |
| Science | 12.6 | |
| English | 14.2 | |
| Other Languages | 4.8 | |
| Business & Technology | 19.7 | |
| Arts | 15.2 | |
| Social Studies | 15.5 | |
| Student Services | 3.2 | |
| Gender | | |
| Male | 60.9 | |
| Female | 39.1 | |
| Leadership Role | | |
| Subject Head (or Assistant) | 31.6 | |
| New Facilitator | 4.4 | |
| Full time teacher | 58.0 | |
| Part time teacher | 6.0 | |
| | **Mean** | **SD** |
| Teaching Experience (Career) | 16.6 | 9.37 |
| Teaching Experience (School) | 11.6 | 8.90 |

**Table 3 Within-teacher Predictors of Teacher Efficacy: HLM Analysis** (n=196)

| | Base-only Model | | | Within-teacher Predictors | | |
|---|---|---|---|---|---|---|
| Predictor | Coeff. | SE | t | Coeff. | SE | t |
| Base | | | | -.028 | .085 | -.336 |
| Grade | | | | .013 | .033 | .389 |
| Track | | | | -.083 | .038 | -2.160* |
| Within-teacher variance | | .562 | | | .417 | |
| Between-teacher variance | | | | | | |

**Table 4 Between- and Within-teacher Predictors of Teacher Efficacy: HLM Analysis** (n=196)

| Outcome | Predictor | Coefficient | Standard Error | t |
|---|---|---|---|---|
| Base | Facilitator | -.472 | .182 | -2.595 |
| | Math | .128 | .117 | 1.096 |
| | Science | .025 | .118 | 1.743 |
| Grade | Facilitator | .020 | .009 | 2.229 |
| | Math | -.006 | .006 | -1.050 |
| | Science | -.009 | .006 | -1.656 |
| Track | Facilitator | -.048 | .016 | -2.914 |
| | Math | .010 | .011 | .971 |
| | Science | .019 | .011 | 1.817 |
| Within-teacher variance | | | | |
| Between-teacher variance | | | | |

**Table 5 Results of Step-wise Regression of Teacher Efficacy on Within-teacher Variables**

| | Course 1 (n=328) | | Course 2 (n=312) | | Course 3 (n=291) | | Course 4 (n=210) | |
|---|---|---|---|---|---|---|---|---|
| | T | p | T | p | T | p | T | p |
| Constant | -2.183 | .030 | -1.99 | .047 | -2.748 | .006 | -2.044 | .042 |
| Match with teacher's subject | 2.087 | .038 | 2.137 | .033 | .949 | .343 | 2.216 | .028 |
| Grade | -.981 | .327 | 1.017 | .301 | 2.952 | .003 | .098 | .921 |
| Track | .933 | .352 | .218 | .828 | -1.36 | .175 | -1.158 | .248 |
| | F(1,327)=4.355 P<.038 $R^2$=.013 | | F(1,311)=4.567 P<.033 $R^2$=.014 | | F(1,290)=8.714 P<.034 $R^2$=.029 | | F(1,209)=4.909 P<.078 $R^2$=.023 | |

**Table 6 Results of Step-wise Regression of Teacher Efficacy on Pooled Within- and Between-teacher Variables (First Run Only)**

| | T | p |
|---|---|---|
| Constant | -2.100 | .037 |
| Within-teacher variables (pooled) | | |
| Match with teacher's subject | 2.078 | .039 |
| Grade | -.481 | .631 |
| Track | 1.098 | .273 |
| Between-teacher variables | | |
| Gender | -.745 | .457 |
| Years of teaching (career) | .930 | .353 |
| Years of teaching (school) | 1.585 | .114 |